Permit to Operate (Change of Conditions)

Applicant Eastern Municipal Water District (EMWD) –Perris Valley Regional Water Reclamation Facility (PVRWRF)

Mailing Address 2270 Trumble Road
P.O. Box 8300
Perris, CA 92572

Equipment Location 1301 Case Road
Perris, CA 92570

Equipment Description
APPLICATION 503372, FACILITY ID 007417

INTERNAL COMBUSTION ENGINE, WAUKESHA, MODEL 9390 GSI, SERIAL NO. C10379/2, NATURAL GAS FIRED WITH LPG AS STANDBY FUEL, 16-CYLINDER, FOUR CYCLE, RICH BURN, TURBOCHARGED, AFTERCOOLED, 1970 BHP, WITH AUTOMATIC AIR-TO-FUEL RATIO CONTROLLER, DRIVING A EMERGENCY ELECTRIC GENERATOR, VENTED TO A THREE WAY CATALYST, MIRATECH, MODEL NO. EQSY48361X2-18-C4.

Background/Process Description

The above application was submitted on November 4, 2009 as a Proposed Alteration/Modification to Permitted Equipment application type to change a non-emergency natural gas fired engine into an emergency natural gas fired engine. This application was determined to be a Change of Conditions, since there is no process change, change in equipment, or increase of emissions. The existing permit for this engine is Permit R-F64918, A/N 409351 originally granted on December 11, 2003 and re-issued September 21, 2004 and incorporated into the initial Title V permit on October 31, 2008. The proposed alteration is to convert the non-emergency engine into an emergency engine. The previous application, A/N 409351, was to convert the engine from emergency to non-emergency. This engine is used for electrical generation.

The facility is a municipal water district which accepts and treats municipal sewage and produces recycled water for a 120 square mile area in Perris, Sun City, Romoland, and part of Moreno Valley. Eastern Municipal Water District-Perris Valley Regional Water Reclamation Facility (EMWD-PVRWRF) currently consists of two separate wastewater treatment facilities, a 3 MGD and 8 MGD facility. The 3 MGD facility was originally built in 1982 as a 1 MGD until the capacity was optimized to 3 MGD in 1991. The 8 MGD treatment facility has been in operation since 1994. EMWD is in the process of installing a new plant (Plant 3) and modifying the other two plants. Plant expansion is planned for 24.2 MGD. There is no school within 1000 feet of emission source. NOV #P49737 was issued March 31, 2009 for operating a stationary internal combustion engine in a manner that exceeds the emission concentration limits for NOx.

Emission Calculations

Assume R1 = R2 Emissions are based on operating schedule of 50 hours per year, 4.2 hours per month. The operating period for maintenance and testing shall not exceed 4.2 hours in any one month (see Engineering & Compliance Memo dated March 2, 2000).

Engine Specifications
Exhaust flow rate: 9,920 acfm, 2,997 dscfm, 179,840 scfh
Maximum natural gas consumption: 17,361 cf/hr

CO emissions
LAER/BACT requirement: 0.6 g/bhp-hr
0.6g/bhp-hr x 1970 bhp x 1lb/453.6g = 2.60 lbs/hr = 0.36 lb/day (NSR)

NOx emissions
LAER/BACT requirement: 0.15 g/bhp-hr
0.15g/bhp-hr x 1970 bhp x 1lb/453.6g = 0.65 lbs/hr = 0.09 lb/day (NSR)

PM10 emissions
LAER/BACT: Clean Fuels Policy (NG & LPG are clean fuels)

10.00 lb/MMscf* x MMscf/1E6scf x 17,361 scfh x 0.994PM10/PM**
= 0.17 lbs/hr = 0.02 lbs/day (NSR)
*Based on SCAQMD AER Emission Factors (PM) for Natural Gas, 4-stroke, rich burn ICE.
**Weight fraction for particulate matter for stationary ICE-gas

0.0095 lb/MMBtu^ x 1MMBtu/1E6Btu x 1050Btu/scf x 17,361 scfh
= 0.17 lbs/hr = 0.02 lbs/day (NSR)
^Based on EPA AP-42, July 2000 Uncontrolled Emission Factors (PM10) for 4-Stroke Rich-Burn Engines (assuming sulfur content in NG is 2,000 gr/1E6scf).

Rule 404 requirement: Exhaust flow rate: 2,997 dscfm, 0.125 grains/dscf
0.125 grains/dscf x 2,997 dscfm x 60min/hr x 1lb/7000grains = 3.20 lbs/hr > 0.17 lbs/hr

ROG emissions
LAER/BACT requirement: 0.15 g/bhp-hr
0.15g/bhp-hr x 1970 bhp x 1lb/453.6g = 0.65 lbs/hr = 0.09 lb/day (NSR)

SOx emissions
LAER/BACT: Clean Fuels Policy (NG & LPG are clean fuels)

0.60 lb/MMscf* x MMscf/1E6scf x 17,361 scfh = 0.01 lbs/hr = 0.00 lbs/day (NSR)
*Based on SCAQMD AER Emission Factors (SO2) for Natural Gas, 4-stroke, rich burn ICE.

0.000588 lb/MMBtu^ x 1MMBtu/1E6Btu x 1050Btu/scf x 17,361 scfh
= 0.01 lbs/hr = 0.00 lbs/day (NSR)
^Based on EPA AP-42, July 2000 Uncontrolled Emission Factors (SO2) for 4-Stroke Rich-Burn Engines (assuming sulfur content in NG is 2,000 gr/1E6scf).

BACT requirement: Rule 431.1 compliance: 1) Natural gas ≤ 16 ppmv, 2)Facility wide emission < 5 lbs/day

1) 16 ppmv x 2,997 dscfm x 60 min/hr x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64.07 lbsH2S/lbmole SO2 = 0.49 lbs/hr SOx (as SO2)
2) 5 lbs/day H2S x lb-mole/34.08 lbsH2S x 64.07 lbsSOx/lb-mole = 9.40 lbs/day SOx (as SO2)
   = 0.39 lbs/hr SOx (as SO2)

   Annual Emissions (AER 2009) SOx emission: 0.017 tons/yr
   0.017 tons/yr x 2000lbs/ton x 1yr/365days = 0.093 lbs/day SOx
   = 0.004 lbs/hr SOx

Toxic Risk Analysis

Nearest Residential Receptor Distance: 3846 ft. (1173 m)
Nearest Commercial Receptor Distance: 1157 ft. (353 m)
Stack height: 34.33 ft. (10.5 m)
Stack inner diameter: 16.0 in. (0.41 m)
Rain cap: Yes
Exhaust flow rate: 9,920 acfm
Building height: 31.33 ft. (9.55 m)
Building dimensions 88.80 ft. (27.0 m) x 104.40 ft. (31.8 m), 9,270.72 sq.ft.

Compound	MW (lbs/lbmole)	Outlet emission (lb/hr)
Ammonia	17.03	3.12E-01
Benzene	78.11	2.80E-02
1,3-Butadiene	54.09	1.17E-02
Carbon tetrachloride	153.24	3.14E-04
1,2-Dichloroethane	98.96	2.00E-04
1,2-Dibromoethane	187.88	3.77E-04
Formaldehyde	30.03	3.63E-01
Methylene chloride[1]	84.94	7.29E-04
PAHs	252.3	1.72E-03
Vinyl chloride	62.50	1.24E-04

The emission rates for the toxic air contaminants (TACs) are based on Annual Emission Reporting Default Toxic Emission Factors for Natural Gas Combustion for Stationary and Portable Internal Combustion Engines (4 stroke, rich burn).

[1] Exempt compounds that are not considered as VOCs by Rule 102.

Tier III analysis was used since the exhaust stack does have a rain cap. Tier III risk analysis was based on the emission rates listed in the above table. Building downwash calculations were based on a building 26.0ft(7.93m) tall, 61.5ft(18.75m) x 117.83ft(35.92m). The MICR values are determined to be 1.26 x 10^{-7} for residential and 1.79 x 10^{-7} for commercial receptors. HIA and HIC were less than 1. Cancer Burden was less than 0.5.

Emissions Summary

Emission Total (based on NSR lbs/day values)
A/N 499897 (DG Treatment System and Fuel Cell Power Plant)

CO	= 0.04 lbs/hr	= 0.97 lbs/day
NOx	= 0.01 lbs/hr	= 0.24 lbs/day
PM10	= 0 lbs/hr	= 0 lbs/day
ROG	= 0.08 lbs/hr	= 1.95 lbs/day
SOx	= 0 lbs/hr	= 0 lbs/day

A/N 503372 (ICE (>500HP) Em Stat NG & LPG)

CO	= 2.60 lbs/hr	= 0.36 lbs/day
NOx	= 0.65 lbs/hr	= 0.09 lbs/day
PM10	= 0.17 lbs/hr	= 0.02 lbs/day
ROG	= 0.65 lbs/hr	= 0.09 lbs/day
SOx	= 0.01 lbs/hr	= 0 lbs/day

A/N 505538 (Boiler (5-20 mmBtu.hr) Other Fuel)

CO	= 0.75 lbs/hr	= 18.25 lbs/day
NOx	= 0.37 lbs/hr	= 9.00 lbs/day
PM10	= 0.06 lbs/hr	= 1.46 lbs/day
ROG	= 0.05 lbs/hr	= 1.22 lbs/day
SOx	= 0.29 lbs/hr	= 7.06 lbs/day

Total of all applications (499897, 503372, and 505538)

CO	= 3.39 lbs/hr	= 19.58 lbs/day
NOx	= 1.03 lbs/hr	= 9.33 lbs/day
PM10	= 0.23 lbs/hr	= 1.48 lbs/day
ROG	= 0.78 lbs/hr	= 3.26 lbs/day
SOx	= 0.30 lbs/hr	= 7.06 lbs/day

Previous Emission Total (based on NSR lbs/day values)
A/N 409351 (ICE (>500HP) N-Em Stat NG)

CO	= 2.60 lbs/hr	= 63 lbs/day
NOx	= 0.65 lbs/hr	= 16 lbs/day
PM10	= 0.16 lbs/hr	= 4 lbs/day
ROG	= 0.65 lbs/hr	= 16 lbs/day
SOx	= 0.01 lbs/hr	= 0 lbs/day

Total Emission Increase (based on NSR lbs/day values)

CO	= 0.79 lbs/hr	= -43.42 lbs/day
NOx	= 0.38 lbs/hr	= -6.67 lbs/day
PM10	= 0.07 lbs/hr	= -2.52 lbs/day
ROG	= 0.13 lbs/hr	= -12.74 lbs/day
SOx	= 0.01 lbs/hr	= 7.06 lbs/day

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- On-site emission increases does not exceed the following:

Volatile Organic Compounds	30 lbs/day
Nitrogen Oxides	40 lbs/day
PM10	30 lbs/day
Sulfur Dioxide	60 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212(c)(3)(A)(i)- MICR is below 1 in a million.
Public Notice is not required.

Rule 401: Visible Emissions
No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected with proper operation, monitoring and maintenance. Based on previous operation of the facility for the last two years, compliance is expected. No complaints have been received in the last four years against the facility.

Rule 404: Particulate Matter
No violations are expected limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407 (b)- Provisions of this rule shall not apply to emissions from stationary ICEs.

Rule 409: Combustion Contaminants
Provisions of this rule shall not apply to emissions from ICEs.

Rule 431.1: Sulfur Content of Gaseous Fuels
Rule 431.1(c)(1)- Natural gas contains ≤ 16 ppmv sulfur compounds as H2S.
Rule 431.1(g)(8)- Any facility which emits less than 5 pounds per day total sulfur compounds, calculated as H2S from the burning of gaseous fuels other than natural gas (not applicable to (c)(1)).
Compliance is expected.

Rule 53A: Riverside County – Specific Contaminants (Contained in Addendum to Reg IV)
Rule 53(a)- Sulfur compound emission limit, as SO_2 50,000 ppmv. Compliance can be expected based on other similar category ICE permits issued in SCAQMD.
Rule 53(b)- Fluorine compounds to be controlled to the maximum degree technically feasible. No fluorine potential emission from this equipment. Compliance is expected.

Reg IX: Standards of Performance for New Stationary Sources
Part 60, Chapter I, Title 40 of Code of Federal Regulations, Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
60.4230-Applicability: not applicable.
60.4230(a)- Construction for this ICE did not commence nor was the ICE reconstructed after June 12, 2006.

60.4230(b)-This ICE is not being tested at an engine test cell/stand.
60.4230(f)- This ICE is not a temporary unit.

Reg IX: Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
63.6585(a)- Applicability: Applicable.
63.6590(a)(3)(i)- Reconstructed stationary RICE: stationary RICE > 500 HP located at a major source of HAP emissions and was reconstructed (see 63.2). Reconstruction commenced on or after December 19, 2002. Previous application A/N 409351 received PC for retrofit 1/28/2003.
63.6590(b)(1)(i)-The engine is a reconstructed emergency stationary RICE >500 HP located at a major source of HAP emissions, therefore is not required to meet the requirements of this subpart and of subpart A of this part.

Rule 1110.2: Emissions From Gaseous and Liquid-Fueled Engines
Rule 1110.2(d)- Equipment is exempt under Rule 1110.2(h)(2).

Rule 1110.2(e)(3)- Stationary Engine CEMS
Rule 1110.2(e)(3)(B)- CEMS is not required.
Rule 1110.2(e)(4)(A)- I&M plan has been submitted. Determination has not yet been made for this application.
Rule 1110.2(e)(5)(B)- These engines meet the Air-to-Fuel Ratio Controller requirement.

Rule 1110.2(f)(1)(A)-Engine not subject to Rule 1110.2(d)(1), therefore Rule 1110.2(f) does not apply.
Compliance with all applicable requirements of this Rule can be expected.

Reg XIII: Rule 1303(a)- LAER/BACT is already equipped, if it were not equipped, BACT would apply. LAER/BACT required (major source).
LAER/BACT: CO: 0.60 g/bhp-hr, NOx: 0.15 g/bhp-hr, VOC: 0.15 g/bhp-hr (see BACT determinations A/N 359876).
Rule 1303(b)(1)- Modeling is not required, emergency equipment is exempt from modeling under Rule 1304(a)(4).
Rule 1303(b)(2)- Offsets are not required; emergency equipment is exempt from offsets under Rule 1304(a)(4).
Compliance is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6}. Estimated Risk is 1.26×10^{-7} for residential and 1.79×10^{-7} for commercial receptors.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
Compliance is expected

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Reg. XXX: The installation of the digester gas treatment system and fuel cell power plant, change of conditions of the stationary ICE and installation of the digester gas and natural gas boiler is considered a Title V De Minimis Significant permit revision under Rule 3000(b)(6), since the cumulative emission increases of non-RECLAIM pollutants or HAPs do not exceed the emissions in Table 5-4 of the Draft Title V TDG March 2005 and does not result in new or additional NSPS or NESHAP requirements and will be subject to an EPA review (Rule 3003(j)). A public notice is not required.
Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Operate is recommended for application 503372. For Permit Conditions please see Sample Permit. A revised Title V permit is recommended after EPA review.